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MALIGNANT TUMORS—CANCER.

By J. M. McWHARF.

IN 1909 we presented to the Academy of Science a paper on the subject of cancer. An effort was made to give in detail all the facts known to the medical world concerning this much-dreaded and fast-increasing disease. After five years of careful study by eminent men in the profession, scientists, we are yet unable to say to the world that we have conquered the disease and here is the panacea. In our study of cancer we turn to accessible literature and the latest teaching of pathology pertaining to the growth of neoplasms in their various forms, clinical and microscopical. Histology of malignant disease is almost nil. From statistical reference we know that cancer is more prevalent in some districts than in others. That it is common in some trades or vocations and quite uncommon in others.

Considering the question from this viewpoint, we are forced to conclude that there must be some element in the environment of the individual that brings on the disease. Mechanical irritation is said to be a factor in the production of cancer, but the theory is not a satisfactory one; we can not always determine. We can not see what mechanical irritation can produce a sarcoma of the uterus and many other malignant diseases. I therefore conclude that it is parasitic disease. We have a warty disease in potatoes due to a minute fungoid organism, which in character is essential to the cells of malignant tumors. Biologists call them Mycetozoa or Myxomycetes. If this disease has full sway the potato is formed into a wrinkled mass that soon decays or dries up.

A writer asserts that irritation and hypertrophy of cells may be caused by parasites which never bring their protoplasm into direct contact with that of their host, and may stimulate it through both cell walls to an abnormal growth. These cells grow larger and divide more frequently than the normal, the sap changes color to red, while the numerous compound crystals normally found in the tissues diminish in number and are different in shape, large quantities of starch are stored up, and even the vascular bundles are altered in character.

These changes indicate a profound alteration in the physiological work of the protoplasm of the cells of the host, and yet the fungoid germ has done its work through its own cell walls and those of the host. If these organisms have the power to produce abnormal growth in vegetable cells, can we not theoretically say that the unlimited cell formation in cancer is thus produced. A wide difference exists between vegetable and animal cells, but the fact remains that fungoid pests of plants are communicated to and produce the death of insects. These organisms are found upon the border line between plants and animals.

Will not a more thorough investigation of the life history of certain organisms that are to be found on the border line clear up much that seems obscure in regard to the cancer? Weronin, in 1878, asserted that malignant growths in man might eventually prove to be due to a parasite of a similar nature. Careful study of the morphology and biology of the various fungi will more forcibly impress us with the belief that cancer is of parasitic origin, and if this theory is accepted we are to conclude that it must be due to an organism belonging to some of the various fungi which induce malignant growths in plants; that in certain cases the cells of the host become its own parasite.

Starting with this hypothesis—that cancer is due to a parasite not unlike the Myxomycetes—it would be exceedingly gratifying if our knowledge regarding the physiology and metabolism of such organisms were more perfectly understood. Unfortunately, there has been very little investigation along this line. This neglect is due, doubtless, to the fact that zoölogists are not agreed upon the question as to their place of consignment; that is, are they plant or animal? Our knowledge of the entire group of organisms known as Myxomycetes is so obscure at this writing that we are unable to arrive at a fairly good conclusion as to the part they play in the production of disease. Time and close application to the study of the subclasses will alone reveal much needed light. *Plasmodiophora brassicæ* is a parasite that has cost the agriculturists much from a financial standpoint. They have learned, however, when manures have been subjected to the action of sulphuric acid this parasite is almost sure to appear in the plant. Doctor Ward, an eminent authority, says finger-and-

toe disease of plants is due to *Plasmodiophora*; that the disease is nearly or quite unknown if the soil contains a high percentage of lime. If sulphuric acid plays a part in the production of cancer, and the cancer organism is akin to the Myxomycetes, then lime would play a large part not only in prevention but the cure.

We will cite a few of the many occupations that could be brought forward to prove the theory that sulphuric and sulphurous acids enter largely as a factor in the production of cancer. The chimney sweep in his vocation shows the highest ratio, and is placed at the head. He comes in contact with a soot that contains ammonia and sulphurous acid. They are products of combustion. Coal soot, when it comes in contact with a plant, injures its growth, but pure carbon soot derived from benzine produces no deleterious effects upon them. Stockhardt demonstrated this fact. The brewer uses a bisulphide of lime as an antiseptic. It is prepared by saturating a solution of sulphite of lime with sulphurous acid. The tin-plate manufacturers immerse the blocks of iron in sulphuric acid before the tin is applied. The X-ray cancer is produced by the hyposulphides acting upon a weakened skin resistance. We feel that time will not permit the introduction of a larger number of illustrations. The above vocations give a large mortality rate for cancer. We assert here that a careful study by scientific investigation has proven the truth of the assertion that a very much larger number of cancer cases are shown in all the vocations where sulphuric and sulphurous acids are used.

We study the ideal human body as a symmetrical product; each part is developed in perfect harmony. Frequently independent growths are formed upon the body. They are groups of rebellious cells which have started upon an independent existence. These cells may be harmless, and frequently are; hence of no importance. They may be malignant and destroy life. Tumors are classified in a general way as benign and malignant. A benign tumor reaches a certain stage of growth and ceases to act. A malignant tumor has the power of unlimited growth. Cancer once started is a destroyer of tissue and of life. A benign tumor may develop new vitality and become malignant. Can we not say, then, that all tumors are in a sense related? Cancer does not always confine itself to the point of starting. Cells break loose from this point and

are carried by the blood to other parts of the body, where they lodge and start new foci of the disease. In our study of this subject many suggestive questions confront us. We know that the oxygen of the blood enters the cells by diffusion; that a greater amount is consumed in early than advanced life. The cells of advanced life, having a less supply of oxygen, are more amenable to malignant disease. A lack of free oxygen suggests a predisposition to cancer. It is found that a malignant disease produces an increased rate of the pulse. We are here notified of a fact, viz., that the tissues are in need of more oxygen for the blood.

Small lung capacity, with a small pulmonary artery, predisposes to cancer. It has been shown that blood taken from a cancer patient contains a greatly reduced amount of hæmoglobin. One thousand grammes of normal blood contains 125 grammes of hæmoglobin. In cancer there is frequently but 25 grammes. Such evidence is usually manifest early in the disease.

Green, in his work on cancer, gives coal combustion in grates and chimneys as one of the exciting causes. He states that a product of that combustion is sulphurous acid, sulphur dioxide and sulphur trioxide; that these gases are heavier than air and are frequently recognized as being present in the room; that soot and coal tar is usually found in abundance in the chimney, and that the air of the room is impregnated from the soot and the sulph-acids. Green further states that, almost without exception, houses in which cancer has occurred have badly drawing chimneys, and he gives it as his belief that this is one of the keys to the problem.

Now, if sulphuric and sulphurous acids are important factors—and we believe that they are—in the production of cancer, then as a preventive we should, where possible, avoid contact with any and all materials that contain them. When the disease is once established, and we hold that it is due to an organism not unlike the *Myxomycetes*, the question of prescribing calcium is of supreme importance.

Starting with the theory that we have and are combating a parasitic disease, we are forced to take cognizance of the fact that this fungoid organism can flourish only in its optimum temperature. The temperature of a parasitic fungi should approximate that of the body of the host. Otherwise it will not germinate. The normal temperatures of animals vary.

We would therefore have a comparative immunity existing between them. Actual demonstration has proven that a very large percentage of the small fungi are destroyed by a temperature of 50° C. The ray fungus will not germinate at 50° C. Raise it to 70° C. and retain this heat for ten minutes, we destroy the germ. We would suggest as a treatment for cancer, then, the internal administration of calcium, coupled with the application of heat for a period of at least ten minutes at 70° C.

Lime water taken internally has proven of benefit in the cure of warts and other tumors. May we not expect benefit from its use in the treatment of malignant tumors?

Doctor Hood cites a case where a large carcinoma was cured by the internal administration of pulverized oyster shells after they had been baked. Some twenty grains were given two or three times a day. A word in regard to the much-lauded remedy, radium. If it possesses any merit it would be only in the early or primary treatment. Failure seems to be its cognomen. It will soon be forgotten. Ignorance of the nature and pathogenesis of cancer leaves us with a difficult problem upon our hands.

Treatment of the various forms of malignant growths and their curative effects is a much-mooted question. Many and varied internal remedies have been used with no flattering success. Radium, X-ray, Finsen light, and cold cautery, each has supporters, but the facts are that not one has absolutely prevented the neighboring glands from taking on the same growth. To-day we find the medical profession turning towards internal medication. The desire is to secure some chemical substance which, when administered by the mouth, will produce the desired result. If a chemical is found that when given internally will destroy the cancer cell, we will have produced the cure. I look with great favor upon this line of procedure.

While the disease is local, benefit may be derived from the use of the various caustics, as chloride of zinc, caustic potash or soda, acid nitrate of mercury, lactic acid, etc. Not one of these, however, is as reliable as the knife. To-day the important rule is: Remove early the growth fully and completely by the knife.

CONCLUSION.

1. From all data received, we conclude that cancer is a parasitic disease.
2. That sulphuric and sulphurous acids are exciting causes.
3. That heat 70° C. externally, coupled with internal administration of calcium, is at least a rational treatment.
4. We have no known specific.
5. That it is a local disease at first.
6. That it may be communicated from one person to another.
7. That a resort to the knife early in the disease (while it has a local focus) is by far the best and safest treatment.